

WHAT IS CLAIMED IS:

- 1 1. An optical inspection system for inspecting a surface under
2 inspection, said inspection system comprising:
3 an optical illumination system for producing a beam for
4 illuminating a surface under inspection;
5 a detector for measuring an intensity of said reflected
6 light;
7 a partially reflective surface positioned between said
8 surface under inspection and said optical illumination system
9 forming a resonator with said surface under inspection, whereby
10 a signal generated by light reflected from defects on said
11 surface under inspection that exceed a predetermined height is
12 increased due to multiple reflections within said resonator; and
13 a scanning system for moving said beam across said surface
14 under inspection.

- 1 2. The optical inspection system of Claim 1, wherein said
2 resonator has a non-linear response with a height of said
3 defects, whereby a signal generated by light reflected from
4 artifacts that do not exceed said predetermined height is
5 decreased.

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1 3. The optical inspection system of Claim 1, wherein said
2 resonator comprises a partially reflective surface positioned
3 substantially parallel to said surface under inspection between
4 said optical illumination system and said device and at a tuned
5 optical distance from said surface under inspection, whereby a
6 signal generated by light reflected from said defects exceeding
7 said predetermined height is increased due to multiple
8 reflections between said partially reflective surface and said
9 surface under inspection.

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1 4. The optical inspection system of Claim 1, wherein said
2 partially reflective surface is a coating deposited on said
3 surface under inspection.

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1 5. The optical inspection system of Claim 1, wherein said
2 partially reflective surface is a surface of an optical element
3 contained within said optical illumination system.

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1 6. The optical inspection system of Claim 5, wherein said
2 partially reflective surface is a coating deposited on said
3 optical element.

1 7. The optical inspection system of Claim 1, further comprising
2 a positioner mechanically coupled to said partially reflective
3 surface for positioning said partially reflective surface at a
4 tuned optical distance from a region of said surface under
5 inspection.

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1 8. The optical inspection system of Claim 7, further comprising
2 a controller coupled to said positioner for adjusting said
3 position of said partially reflective surface in response to a
4 signal received from said detector.

1 9. The optical inspection system of Claim 7, further comprising:
2 a controller coupled to said positioner for adjusting said
3 position of said partially reflective surface; and
4 a processing system coupled to said controller.

1 10. The optical inspection system of Claim 9, wherein said
2 processing system is further coupled to an output of said
3 detector, whereby said position is adjusted in conformity with
4 said output of said detector.

1 11. The optical inspection system of Claim 10, wherein said
2 detector comprises a plurality of detectors for detecting a tilt
3 of said surface under inspection, and wherein said processing
4 system adjusts said position of said partially reflective
5 surface to maintain said position of said partially reflective
6 surface substantially parallel to a region of said surface under
7 inspection.

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1 12. The optical inspection system of Claim 10, wherein said
2 partially reflective surface includes a secondary tier
3 positioned at a second tuned optical distance from said surface,
4 and wherein said detector detects light that is transmitted
5 through said secondary tier whereby sensitivity of said detector
6 is improved.

1 13. An optical inspection system for inspecting a surface under
2 inspection, said inspection system comprising:

3 an optical illumination system for producing a beam for
4 illuminating a surface under inspection;

5 a detector for measuring an optical signal from light
6 reflected from said surface under inspection;

7 means for increasing an optical signal generated by light
8 reflected from defects on said surface under inspection that
9 exceed a predetermined height; and

10 a scanning system for moving said beam across said surface
11 under inspection.

1 14. The optical inspection system of Claim 13, wherein said
2 increasing means further comprises means for decreasing an
3 optical signal generated by light reflected from defects that do
4 not exceed said predetermined height.

1 15. The optical inspection system of Claim 13, further
2 comprising second increasing means for increasing an optical
3 signal for controlling position of said first increasing means.

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4 16. An optical inspection system for inspecting a surface under
5 inspection, said inspection system comprising:

6 an optical illumination system for producing a beam for
7 illuminating a surface under inspection;

8 a detector for measuring an optical signal from light
9 reflected from said surface under inspection;

10 means for decreasing an optical signal generated by light
11 reflected from defects on said surface under inspection that do
12 not exceed a predetermined height; and

13 a scanning system for moving said beam across said surface
14 under inspection.

1 17. A method for inspecting a surface under inspection, said
2 method comprising:

3 illuminating a partially reflective surface with an
4 illumination beam from an illumination subsystem;

5 illuminating said surface under inspection with a
6 transmitted beam that is transmitted from said illumination beam
7 through said partially reflective surface, wherein said
8 partially reflective surface and said surface under inspection
9 are positioned substantially parallel to each other and at a
10 tuned optical distance such that a reflected beam reflected from
11 defects on said surface under inspection that exceed a
12 predetermined height has an increased signal sensitivity;

13 positioning said beam at a location on said surface under
14 inspection; and

15 detecting said reflected beam from said defects.

1 18. The method of Claim 17, further comprising depositing a
2 coating on said surface under inspection to form said partially
3 reflective surface.

1 19. The method of Claim 17, further comprising adjusting a
2 position of said partially reflective surface.

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1 20. The method of Claim 19, wherein said adjusting is performed
2 in response to said detecting.

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1 21. The method of Claim 20, wherein said adjusting adjusts a
2 tilt of said partially reflecting surface in response to said
3 detecting having detected that a region of said surface under
4 inspection is tilted, such that said partially reflective
5 surface and said region are maintained in a substantially
6 parallel arrangement.

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1 22. The method of Claim 20, wherein said detecting detects a
2 height of a region of said surface under inspection, and wherein
3 said adjusting adjusts a height of said partially reflective
4 surface such that said tuned optical distance is maintained
5 between said region and said partially reflective surface.

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23. The method of Claim 17, wherein said partially reflective
surface includes a second tier, and wherein said detecting
further comprises second detecting light reflected through said
second tier and wherein said adjusting is performed in response
5 to said second detecting.